

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1-10 (Canceled)

11. (Currently Amended) An apparatus for manufacturing a control rod of a nuclear reactor, the control rod comprising a blade including neutron absorbers inserted in a recess portion of a sheath formed by bending, a tie rod for fixing the blade, a handle fixed to the tie rod and an upper end of the blade, and a lower-blade fixed to the tie rod and a lower end of the blade,

said apparatus comprising a welding apparatus for welding the blade to the tie rod, the blade to the handle and the blade to the lower-blade,

said welding apparatus comprising:

an image pickup apparatus for picking up images of a portion near a groove of objects to be welded;

a first work head on which the an image pickup apparatus is mounted;

a moving apparatus for moving the first work head to a groove position as designed in each of welding portions;

~~an~~ a first image processing apparatus for processing an image signal picked up by the image pickup apparatus means;

a detecting apparatus for detecting an actual groove position based on image data processed by the first image processing apparatus;

a first arithmetic processing apparatuses for comparing the actual groove position detected by the detecting apparatus with a groove position as designed, and calculating a deviation of the first work head from the groove position;

a first control apparatus for providing the moving apparatus with a control command to move the first work head by a distance corresponding to an amount of the deviation of the first work head calculated by the first arithmetic processing apparatus plus an amount of an offset of the first work head and the image pickup apparatus; and

an a starting apparatus for starting welding after completion of movement of the first work head.

12. (Currently Amended) An apparatus ~~for manufacturing a control rod of a nuclear reactor, the control rod comprising a blade including neutron absorbers inserted in a recess portion of a sheath formed by bending, a tie rod for fixing the blade, a handle fixed to the tie rod and an upper end of the blade, and a lower blade fixed to the tie rod and a lower end of the blade,~~ according to claim 11, wherein:

~~said apparatus comprising a welding apparatus for welding the blade to the tie rod, the blade to the handle and the blade to the lower blade,~~

said welding apparatus ~~comprising~~ comprises a fixing jig for fixing the blade by chillers worked so as to be externally accessible at a welding groove, said fixing jig including bulk or two metal plates containing a cooling mechanism therein, and a space between the metal plates in which the blade including the neutron absorbers and the sheath is inserted.

13. (Currently Amended) ~~An apparatus for manufacturing a control rod of a nuclear reactor, the control rod comprising a blade including neutron absorbers and a sheath, a tie rod for fixing the blade, a handle and a lower blade fixed to the tie rod and the blade, said apparatus according to claim 11, comprising:~~

a work table on which objects to be welded constituting the control rod are set and welding is carried out;

a laser oscillator for outputting one of a YAG laser beam or a CO₂ laser beam;

a second work head comprising an optical system for transmitting the laser beam oscillated by the laser oscillator and converging it to the objects to be welded by a condenser lens;

~~an image pickup apparatus, mounted on the work head, for picking up images of a portion near a groove of the objects to be welded;~~

an a second image processing apparatus for detecting a groove position from the image picked up by the image pickup apparatus;

an a second arithmetic processing apparatus for comparing the groove position obtained by the second image processing apparatus with a groove position as designed, and calculating a deviation therebetween;

a servo motor for moving one of the second work head and the work table by a distance corresponding to an amount of the deviation of the groove position calculated by the second arithmetic processing apparatus plus an amount of an offset of the second work head and the image pickup apparatus; and

a second control apparatus for driving and controlling the servo motor,

said apparatus comprising at least two second work heads and two work tables and a movable mirror between the laser oscillator and the second work heads.

14. (Currently Amended) An apparatus for manufacturing a control rod of a nuclear reactor, ~~the control rod comprising a blade including neutron absorbers and a sheath, a tie rod for fixing the blade, a handle and a lower blade fixed to the tie rod and the blade, said~~ apparatus according to claim 11, comprising:

a work table on which objects to be welded constituting the control rod are set and welding is carried out;

a TIG welding torch;

~~an image pickup apparatus, mounted on the work head, for picking up images of a portion near a groove of the objects to be welded;~~

an a second image processing apparatus for detecting a groove position from the image picked up by the image pickup apparatus;

an a second arithmetic processing apparatus for comparing the groove position obtained by the second image processing apparatus with a groove position as designed, and calculating a deviation therebetween;

a servo motor for moving one of the TIG welding torch and the work table by a distance corresponding to an amount of the deviation of the groove position calculated by the second arithmetic processing apparatus plus an amount of an offset of the welding torch and the image pickup apparatus; and

a second control apparatus for driving and controlling the servo motor,
said apparatus comprising at least two TIG welding torches and two work tables,
which simultaneously or alternately perform welding.